Translation

PCT/FR2003/001149

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference bct030031	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/FR2003/001149	International filing date (*day/month/year*) 11 avril 2003 (11.04.2003)	Priority date (*day/month/year*) 17 avril 2002 (17.04.2002)
International Patent Classification (IPC) or national classification and IPC G01C 19/56		
Applicant --SAGEM S.A.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
24 octobre 2003 (24.10.2003)	08 July 2004 (08.07.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FR2003/001149

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:

pages 1-9, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☒ the claims:

pages 1-2, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the drawings:

pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

V. **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1, 2	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1, 2	NO
Industrial applicability (IA)	Claims	1, 2	YES
	Claims		NO

2. Citations and explanations

Reference is made to the following document:

D1: WO 01 55675 A (FELL CHRISTOPHER PAUL; BAE SYSTEMS PLC (GB)) 2 August 2001 (2001-08-02), cited in the application

1. The present application satisfies PCT Article 33(1) since the subject matter of **claims 1 and 2** meets the novelty requirements of PCT Article 33(2). However, the present application does not satisfy PCT Article 33(1) since the subject matter of **claims 1 and 2** does not involve an inventive step under PCT Article 33(3), for the following reasons:

Novelty:

2. D1, which is considered the prior art closest to the subject matter of **claim 1**, describes (the references in brackets are to that document): a method of producing a mechanical resonator with a flat monolithic vibrating structure machined from crystalline material, wherein, for the single crystal material silicon, the possibility of a vibrating mode of the order of 2 for a crystal cut

in plane [111] and of the order of 3 for a crystal cut in plane [100] is mentioned (see page 5, line 11, to page 6, line 3). Therefore the subject matter of claim 1 differs from this known method in several respects: first, silicon is excluded for cases in which the vibrating mode in the cubic structures is of the order of 2 and the crystal is cut in plane [111] and in which the vibrating mode in the cubic structures is of the order of 3 and the crystal is cut in plane [100], i.e. there is a disclaimer (see PCT International Preliminary Examination Guidelines, chapter 5.41). Second, the known method does not concern cubic structures cut as per [001] or [010]. Finally, the known method does not disclose the manner in which materials with a trigonal, tetragonal or hexagonal structure are machined.

The same applies to the device as per **claim 2**; therefore the subject matter of these claims is novel (PCT Article 33(2)).

Inventive step:

3. The description of the present application (see page 6, lines 26 to 33) asserts that the information provided by D1 is specific and does not give a person skilled in the art any indication as to the other possible cutting planes for silicon or as to the possible cutting planes for other crystalline materials having a cubic, or other, structure.

However, this assertion does not appear to be correct: an expert in the field in question is familiar with the materials used in micro-machining

and their crystalline structure; he is aware that details of the crystalline structure play an important role in the, generally anisotropic, etching of these materials; he is also aware that, although silicon is the preferred material owing to its favourable properties, other materials can be used (quartz, for example). Nowhere does D1 suggest that the phenomenon illustrated in figure 2 would be specific to silicon alone. On the contrary, a person skilled in the art would deduce from the example of silicon given in D1 that the cutting plane of any crystalline material can be determined by reference to the angular behaviour of the calculated, determined or known modulus of elasticity of this material. The essential factor in D1 is neither the choice of material (silicon) nor the shape of the resonator (annular) but the disclosure that an isotropic resonator can be produced by using an anisotropic crystalline material. To that end, D1 describes the principle (studying the modulus of elasticity as a function of the angle of rotation in the plane in question; see D1, page 5, lines 17 to 25) and means of implementing it (analysis using Lagrange equations; see D1, page 5, lines 27 and 28).

It is true that D1 considers only a single resonator shape and a single material. Therefore, it is not asserted here that it would be obvious to use another material if document D1 alone were available. The argument is rather the opposite: given that it is known that different crystalline materials can be used to produce mechanical resonators having a monolithic vibrating structure, a person skilled in the art wishing to produce such

a resonator from this known material (other than silicon) would certainly consult D1.

Having consulted D1, the principle disclosed therein would provide him with all the information necessary for determining a cutting plane for the other crystalline material, that is, this material has to be analysed using the same Lagrange equations, substituting the parameters relevant to this material. The application of this principle automatically produces the same results as those mentioned in claims 1 and 2.

It is not at all clear from the description in the present application how the relations mentioned in the claims are obtained. Although it could be asserted that these relations are the fruit of complex calculations and that the results of these calculations cannot be foreseen, it must be stated that these complex calculations are not mentioned anywhere in the description.

Clearly, the subject matter of the application is not at all insignificant; however, in view of D1 and the principle it discloses, the subject matter of **claims 1 and 2** does not appear to involve an inventive step (PCT Article 33(3)).

4. **Claims 1 and 2** appear to have industrial applicability.